Appendix 2
Operability

Contains:

- Update letter to *RCFC Operability Rationale*
- *RCFC Operability Line Rationale*

Revelstoke
Community
Forest
Corporation

13 March 2000

Bill Beard R.P.F.
Ministry of Forests
Box 9158, RPO #3
Revelstoke, B.C.
V0E 3K0

Re: R.C.F.C. Operability Line Rationale

Dear Bill:

The purpose of this letter is to update the document entitled *R.C.F.C. Operability Rationale* dated February 2, 2000. In our meeting of February 18, in which yourself, Bob Clarke (RCFC), Ken Gibson (MOF), Bob Brade (MOELP), Ken Talbot (MOF), and I attended, you brought up several points in which you desired clarification regarding our operability rationale. Since the points were minor, I am updating the rationale via this letter rather than rewriting the rationale. I would ask that you append this letter to your copy of the rationale.

The points which additional clarification is required are:

1. Section 1, *R.C.F.C. Operability Rationale* Page 3, last paragraph – Note that in the two SBFEP operating areas, the same methodology was used in determining the operability line as in the RCFC operating areas.

2. Section 1, *R.C.F.C. Operability Rationale* Page 4, paragraph 2 – Note that while it is stated that "areas with uneconomic timber types (predominately overmature hemlock and balsam pulpwood stands that require helicopter yarding)" were excluded, a proportion of these stands have actually been retained within the operable forest when it was felt that they were close to existing or future roads and would provide a reasonable aerial harvest possibility. An explanation of how these sites will be dealt with in the timber supply analysis will be included in the timber supply analysis information package. A sensitivity analysis will be conducted around exclusion of hemlock-leading aerial stands.

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3. Section 1, *R.C.F.C. Operability Rationale* Page 4, paragraph 3 – This paragraph deals with reductions in the operable forest due to terrain instability. Further elaboration was requested. Many areas on the edge of the operable landbase were excluded from the operable landbase if there were signs of instability (TSIL level "D" rated unstable, ESA 1, obvious instabilities visible on the orthophotos, level "A" assessments indicating instability). Other areas were included in the operable landbase when an existing level "A" assessment indicated that harvesting was possible. Areas fully within the operable landbase, and areas on the "edge" of the landbase not already excluded as noted above, will be subject to a net-down process discussed in the timber supply analysis information package.

4. Section 2, *RCFC TFL 56 Current Harvest Practices: A Review of Management Plan #2 Harvest Requirements and the 1999 Operability Line,* Page 5, section entitled "*Comparing Harvest History with Forested Landbase"* – The clarification required here was which inventory type groups were included in "hemlock leading" stands and whether deciduous stands were excluded from the forested landbase in the statistics quoted. The hemlock inventory types are groups 12 to 17 inclusive. Deciduous type groups are included, but will be dealt with in the timber supply analysis information package – There are 1082 ha of deciduous leading stands with the operable land base, these will be removed from analysis or placed on special yield curves.

I trust this clarifies the issues that came up in our meeting. If you have any questions, please call.

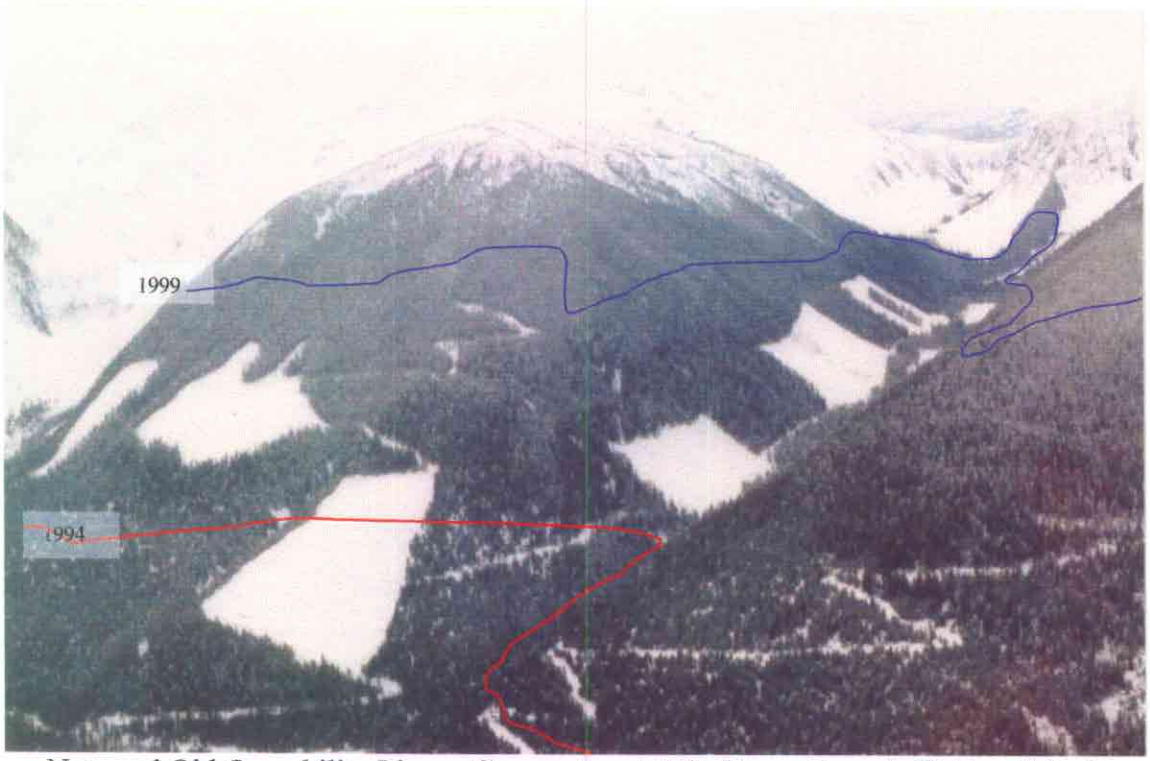
Sincerely,

original signed

Del Williams, R.P.F.
Operations Forester

R.C.F.C. Operability Line Rationale

February 2, 2000



New and Old Operability Lines: Compartment 130, Upper Downie Valley, TFL 56

Included in this package:

1. RCFC Operability Line Rationale

2. Aerial Harvesting in TFL 56 – Past Present and Future

3. RCFC TFL 56 Current Harvesting Practices: A review of Management Plan #2 Harvest Requirements and the 1999 Operability Line

R.C.F.C. OPERABILITY LINE RATIONALE

As part of the Chief Forester's directions for preparation of Management Plan #3 for TFL 56, RCFC must review the operability line that was established in 1994. The following is RCFC's reasoning and rationale for establishing a new operability line on the TFL 56 landbase.

General Comments:

The purpose of defining an operability line is to remove timbered areas from the forest landbase which will not be harvested, resulting in more realistic timber harvest projections. Removal of such areas is usually due to economic considerations or physical barriers such as very steep slopes or inaccessible areas. TFL 56 contains a high proportion of areas which were eliminated from the operable forest land base in the 1994 and previous operability line reviews. The 1994 landbase analysis shows the following breakdown:

1994 TFL 56 Net Operable Landbase Determination

Land Description	**ha.**
Total Landbase	119,505
Non-productive	59,555
Total Productive	**59,950**
Less Inoperable Productive Land	33,607
Less Other Reductions to Productive	5,407
1994 Net Operable-Productive	**20,936**

The significant amount of inoperable productive forest land (33,607 ha.) identified in the 1994 analysis led us to a more in-depth review of the composition of this area and its potential to contribute to the timber supply for TFL 56 as follows:

1994 Inoperable Productive Forest Land Analysis

Land Description	ha.
1994 Total Inoperable-Productive Forest	33, 607
Less Reductions to Inoperable Productive	20,757
1994 Net Inoperable Productive	**12,850**

In the 1994 analysis, 3174 hectares of leading hemlock forest types were removed from the Net Inoperable Productive area leaving 9,676 hectares which were further factored down by 75% to 2,419 ha. This was the amount of area which contributed to the timber harvesting landbase in the proposed "Planned Management Option". While this option was not accepted in its entirety in the Chief Forester's review and subsequent AAC determination in 1995, the additional landbase was used to justify a partitioned cut of 10,000 m3/year which was to come from above the 1994 operability line.

Since that time, RCFC has made great efforts to not only meet the partioned cut objectives, but to exceed them by a substantial margin while experimenting with the viability of a variety of systems and areas. Our performance record in harvesting above the operability line is as follows:

Area Harvested above the Operability Line 1996-1998

Year	ha.	Volume (m3)	% of Volume
1996	103.9	43,519	35.7
1997	106.8	41,989	44.3
1998	29.8	12,905	18.2
Total and Average	**240.5**	**98,414**	**34.3**

Much of the harvesting to date has taken place during difficult forest product markets and during the implementation of the stringent constraints of the Forest Practices Code and land use planning exercises. Many of the stands were overmature hemlock/cedar types which were logged with a combination of cable, long-line and helicopter operations. RCFC feels it has now gained enough experience in addressing the inoperable landbase to proceed with incorporating a large proportion of this formerly excluded area into the operable landbase. Much of this additional landbase contains mature timber, which would help dramatically in maintaining the present AAC on TFL 56. Without the additional mature forest, the AAC will likely decline significantly as a large proportion of the old and mature timber remaining on the 1994 landbase is required for mountain caribou habitat, winter ungulate range or biodiversity corridors. The additional mature timber will help meet the goals and objectives of the Revelstoke Land-Use Plan prepared by the

Minister's Advisory Committee (MAC), while maintaining historic harvesting levels to support the economic and social benefits that the residents of Revelstoke have come to expect from the TFL. A further benefit is that decadent stands of deteriorating timber would be replaced by thrifty young stands which will improve the overall health and productivity of the forests on the TFL in the future

In general, RCFC's philosophy is that each stand does not have to be economically viable in its own right, but, when combined with other stands over the course of the year, it must maintain a profitable corporation. This allows us to blend expensive and/or poor quality timber with less expensive and/or higher valued timber in a profitable manner, as well as enabling us to convert overmature stands of decadent hemlock forest to faster growing, young stands of cedar, spruce and fir, as well as hemlock. This operating philosophy has been employed with some success for the past six years and the company has managed to generate $2.8 million in retained earnings and record a profit in each year of operation. The security of tenure provided by the Tree Farm Licence agreement provides the opportunity to manage the entire forest resource on TFL 56 in a prudent manner for the long term, without fear that another company will "take the best" while less economic timber is being harvested. This assumes, of course, that the MoF Small business Program adopts the same philosophy on it's operating areas in the TFL. RCFC also strives to maintain a broad inventory of developed timber on the TFL which reflect the full spectrum of operating seasons, equipment types (cat, cable, long-line, and helicopter) and species, so that the company can take advantage of market opportunities to ensure that the best possible prices are obtained for logs sold through the log sorting/sales operation. During better log markets, more low value or expensive wood will be blended into the harvesting program while during poor markets, a less costly, higher valued mix will be utilized.

As a large proportion of the low elevation timber with lower harvesting costs and higher value was removed from the licence by the previous owners, it is imperative that good stewardship of the remaining timber resources remain the highest objective for operating TFL 56. Recognizing and capitalizing on the opportunities provided by the entire forested productive landbase is instrumental in achieving this objective.

METHODOLOGY

RCFC used its Total Chance Harvesting Plan (TCHP) for TFL 56 as a base for completing the 1999 operability line revision. The TCHP was recently completed by Grant Simes of Silvatech Forestry Consultants using a Wilde stereo-plotter with 1994, 1:15,000 aerial photography and 1: 5,000 five-meter interval contour mapping as a base map. The plan looked at all harvesting opportunities on the forested land base without regard to the 1994 operability line. This work was fine-tuned with 1994 forest cover mapping, "Level D" terrain hazard mapping, ESA mapping, Avalanche Hazard mapping, Slope Thematic mapping and field knowledge and experience. The new operability line was plotted on the 1:20,000 scale forest cover base maps and checked against 1:20,000 digital-ortho photos which were produced in 1998 using new 1:50,000 aerial photography.

In the TCHP, road systems for the entire TFL were projected based on existing roads and

Ministry of Forest's engineering guidelines for grade control on new roads. Blocks were designed for a combination of ground skidding (slopes less than 30%) and cable yarding (30% to 80% slopes). Yarding distances on cable blocks were limited to 200 meters downhill and 300 meters uphill utilizing medium-sized (e.g. Madill 071) mobile yarders. Areas containing merchantable timber which were not suitable for road construction and conventional skidding or yarding were designed for helicopter logging. Generally these areas were only considered if they were within 1500 meters of a suitable landing site with road access. Longline systems may be used instead of helicopters where deflection is suitable, but specific sites must be identified through detailed ground assessment and they were not distinguished in the TCHP. Block sizes were kept to maximum of 40 hectares although most are less than 15 hectares in size. A clearcutting system was anticipated in block design but many blocks are suited to small group selection where other values dictate a less intrusive harvesting system.

The new operability line removed inaccessible side drainages, areas with uneconomic timber types (predominantly overmature hemlock and balsam pulpwood stands that require helicopter yarding) and slopes that are steep (slopes over 80%) and unstable (as identified in ESA and TSIL D mapping exercises). The side drainages and forested areas that were not included in this revision will be reassessed for inclusion in future operability line reviews.

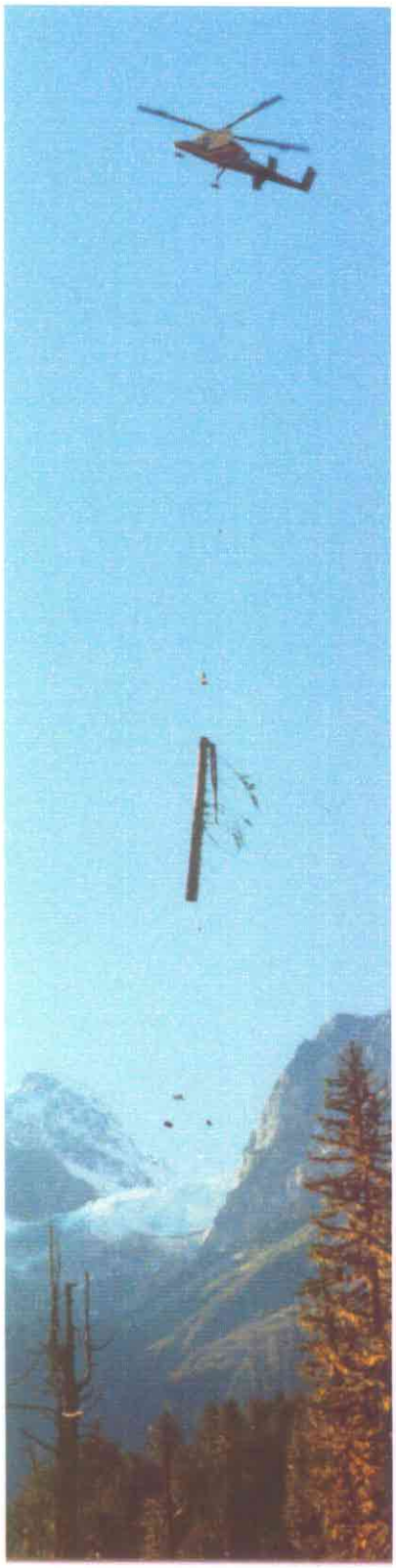
The area "below" the 1999 Operability Line will form the Operable Productive Forest for TFL 56. This area will be subjected to a net down process (described in the Timber Supply Analysis data package) to arrive at a Timber Harvesting Land Base (THLB) which will be used in the Timber Supply Analysis portion of the Management Plan.

Results

The 1999 operability line review has identified an Operable Productive Forest Land Base of 38,362 ha before net downs. This compares to the 1994 Operable Productive Forest Land Base of 26,326 ha before net downs, for an increase of 12,036 ha. Included in the 1999 area is 3827 ha. of area designated for aerial harvest compared to 973 ha. in the 1994 land base. For a more in-depth discussion on aerial harvesting, please refer to the report entitled " Aerial Harvesting on TFL 56: Past, Present and Future"..

Conclusion

Given RCFC's past experience in harvesting timber above the 1994 operability line, the time has come to recognize the full potential of the forest resources on TFL 56 and expand the land base to include previously excluded operating areas. The proposed 1999 operability line will allow RCFC to generate revenues, maintain forest jobs and improve the health and productivity of the forest in TFL 56 while protecting the important non-timber resources of the area.



RCFC TFL 56 Current Harvest Practices: A Review of Management Plan #2 Harvest Requirements and the 1999 Operability Line

Prepared by
Del Williams R.P.F.

January 24, 2000

RCFC TFL 56 Current Harvest Practices: A Review of Management Plan #2 Harvest Requirements and the 1999 Operability Line

Introduction

The purpose of this report is to review the harvest requirements set out in Management Plan #2, review RCFC's success in meeting or exceeding the requirements, and then to propose new harvest requirements for Management Plan #3.

Under Management Plan #2, RCFC had an approved operability line (deemed the 1994 operability line) and a partitioned cut of 10,000 m^3/yr to come from above the operability line. Part of RCFC's proposed management regime under Management Plan #3 is to set a new operability line (deemed the 1999 line) without a partitioned cut.

When Management Plan #2 was proposed, RCFC was a newly formed company owned by the City of Revelstoke. It was seen to be operating in an uncertain environment (publicly owned by a city and jointly managed by a manager, a management committee as well as a board of directors), in difficult terrain (the Selkirk Mountains), and with a low value product (decadent hemlock and cedar), and with a limited track record. Yet this brash new company proposed to aggressively harvest, and profit, within this environment. With these uncertainties, the Chief Forester set a number of safeguards within the context of Management Plan #2 approval.

Two key "safeguards" were:

1. A geographic partition of 10,000 m^3 to come from above the operability line; and
2. The harvest of problem forest types was to be recorded and reported annually.

Additionally, RCFC considered it important to record the use of alternate harvest systems and steep slope harvesting. Since RCFC was operating in such difficult terrain and with a low value product, it was natural to assume that steep and other difficult to access areas would be economically or physically inaccessible.

Harvesting System History in TFL 56

Utilization of suitable harvesting systems is the key to effective utilization of the TFL 56 forested landbase – a fact that was apparent when RCFC purchased TFL 56. Prior to purchase, ground skidding was the prevalent method (although the previous owner --Westar Timber -- had begun some highlead). This method was only suitable for gentle slopes – a small portion of the RCFC forested landbase. When RCFC purchased TFL 56, an immediate shift to cable harvesting systems was made. Yet ordinary cable systems would not be enough – many areas still could not be reached. To access these areas, "alternate" systems would have to be investigated and, if found effective, utilized.

To this end, RCFC first tried **helicopter harvesting** in 1995. Some concerns were that:

- It would be too expensive;
- Wood quality wood be too low;
- Piece size was not optimal;
- There was not enough volume to attract helicopter logging contractors; and
- Proposed yarding distances were too great.

RCFC proceeded with several blocks in an isolated area in Downie Valley and found that while helicopter logging on the TFL did not seem to meet many of the expectations developed on the B.C. coast, it was still a perfectly viable enterprise on TFL 56. Since then RCFC has increased the proportion of lower quality timber in helicopter harvest areas and has used helicopters every year. In 1994, helicopter harvesting comprised close to 0% of the area harvested (some helicopter cedar salvage took place). By 1998 (The 1999 planned helicopter harvest area was felled, but early snows have delayed yarding until 2000) helicopter harvesting comprised 11% of the area harvested. RCFC sees this trend continuing in the future. Helicopter harvesting is now a *current practice*" on TFL 56.

Longline or skyline systems also were deemed to deserve investigation. Again, there usage had a number of possible downsides. The detractors said:

- They would be too expensive;
- Wood quality would be too low; and
- There was not enough volume to make logging contractors purchase the equipment.

RCFC started in 1997 with a single block to be harvested by a local contractor, Murray Saunders, who had developed a skyline machine. The block was completed successfully at a lower cost than if the block had been logged by helicopter. Mr Saunders has now commenced his second block on TFL 56. Meanwhile, RCFC staff investigated Wyssen skyline systems – one of our contractors bought a Wyssen system and as of January 2000, is harvesting his second block on TFL 56 with the system. The two skyline systems available now give us a theoretical capacity in excess of 20,000 m^3 annually.

RCFC has found that it is considerably less expensive to harvest with a longline or skyline system than a helicopter system, that these systems are perfectly viable on TFL 56, and that if encouraged, local contractors will obtain the necessary equipment. RCFC staff foresees a very significant niche for these systems.

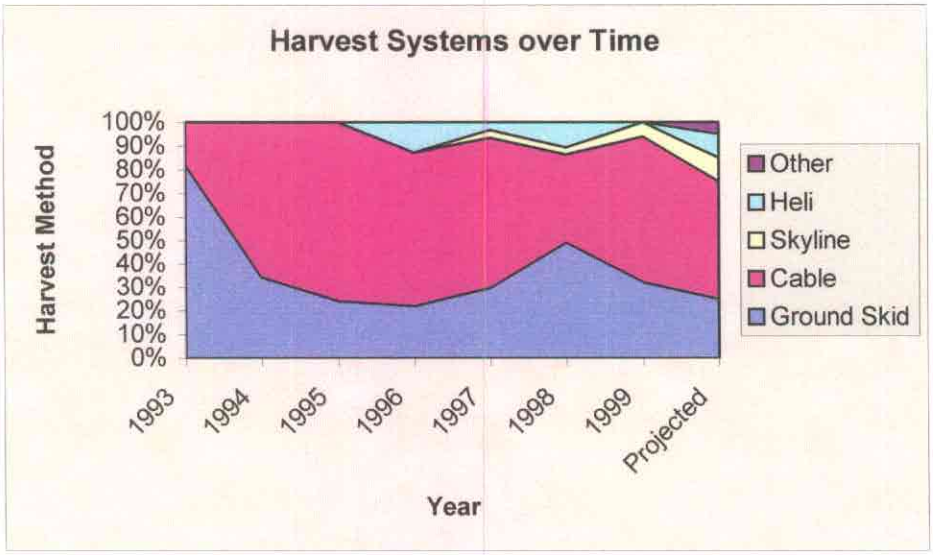
RCFC is also cognisant of the additional benefit to the local economy of the stable workforce employed in skyline or longline systems. Helicopter harvest proceeds at a frenetic pace for a short period. The equivalent volume takes much longer to harvest with longline or skyline methods, avoiding the boom/bust cycle of helicopter logging.

RCFC continues to investigate **other systems** for use on TFL 56. Some that warrant mention here are:

- Use of long distance forwarding with other harvest systems – This is to reduce road costs in cases where the costs would exceed the value of the wood accessed by the road. A forwarder would use a narrower and steeper road thereby lessoning the amount of road and the unit cost of the road.

- Summer ground skid harvesting using low ground pressure equipment – This would be to reduce snow-ploughing costs in high elevation areas. RCFC has shied away from summer ground skidding mainly because few areas were found suitable in recent years and if found suitable, there was a local prejudice against such systems because of poor practices in past decades. New operating areas, such as proposed cutting permit 222, are suitable areas to try out the system.

- Hybrid systems – This includes combination helicopter/cable or helicopter/ground skid. Such hybrid systems allow the creative use of leave trees or larger reserves where required for such reasons as avalanche amelioration or slope instability retention areas. The recently approved cutting permit 121 block 3 employs such a system.

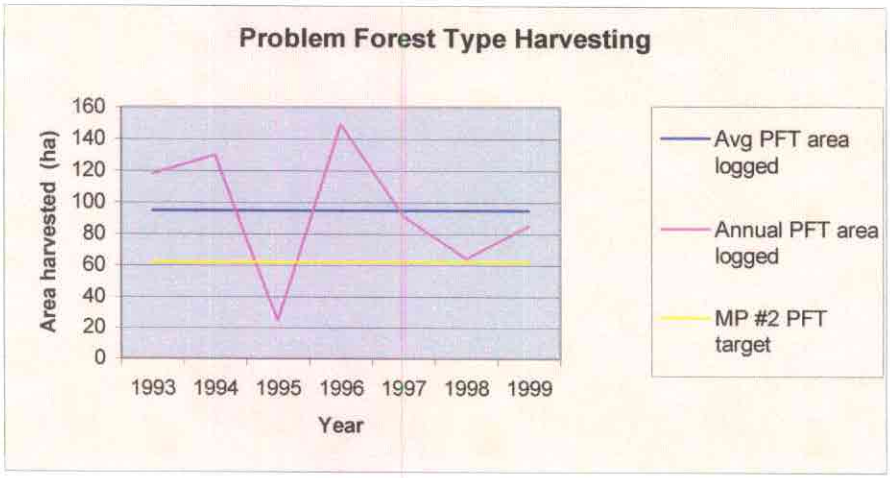


In the chart above, the trends described in the above paragraphs are apparent. In 1993, over 80% of the harvest was derived from **ground skidding**. Ground skidding resurgence in 1997 and 1998 reflected special winter ground skidding in group-selection silvicultural system areas. In the longer term, ground skidding is expected to comprise 25%. **Cable systems** were rapidly deployed in 1994 to cope with the steep slopes in the TFL and have become the most common system. In the longer term, use is expected to be about 50%. **Helicopter systems** were initially tried in 1995 and continue to be used at an average rate of about 9%. Average use is expected to increase to 10%. The first **skyline** area was logged in 1997 – use of skyline and longline systems is projected to increase in the future (to about 10%) now that RCFC has two machines available.

In the MP #3 period, RCFC expects that the projection indicated on the above chart will be reasonable. **"Other"** systems, as described in the paragraphs above, will begin to be used – likely at a rate of about 5%.

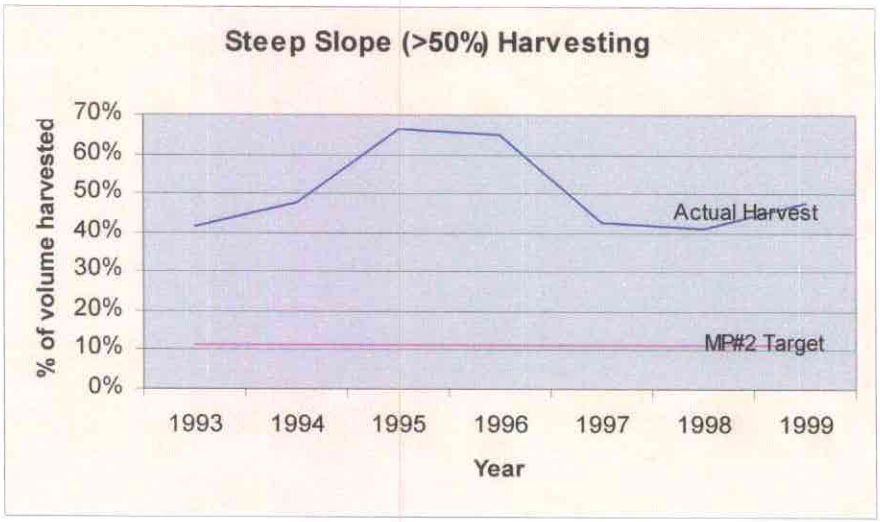
Harvesting History of Low Value Stands in TFL 56

Low value stands have been defined in a number of different ways. One way is by inventory type. In MP # 2, RCFC made a commitment to harvest 62 hectares per year of *problem forest types* (PFT's). Harvest history of all stands with hemlock leading species, age classes 8 and 9, have been collected since RCFC purchased the TFL. This history is presented in the chart below.



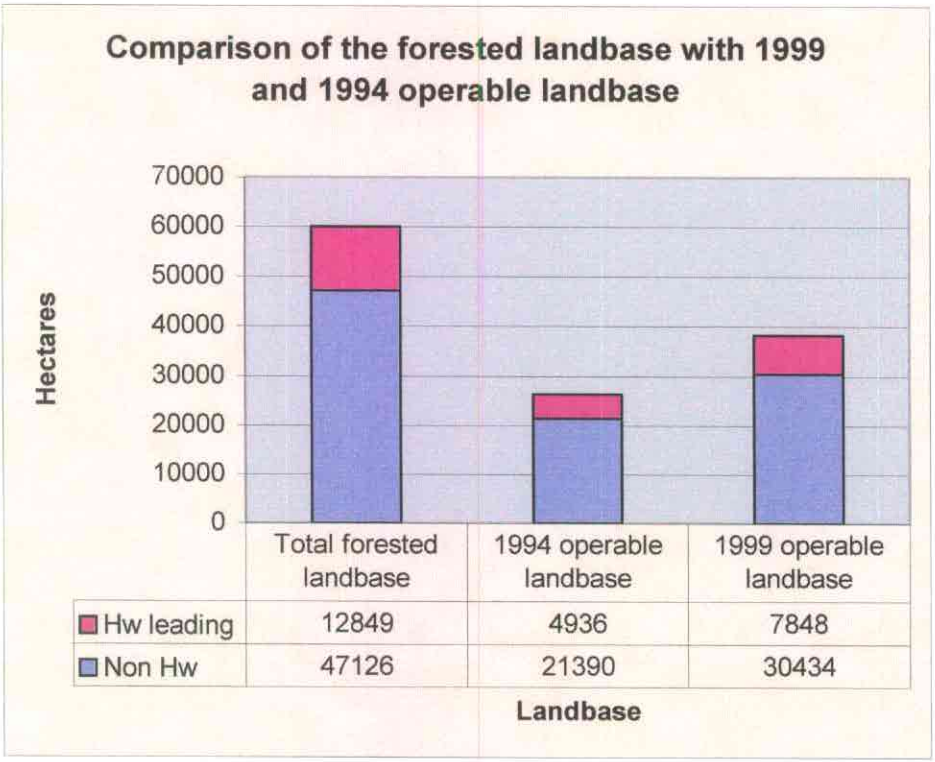
Harvesting History of Steep Slopes in TFL 56

In MP #2, RCFC committed to harvesting a minimum proportion of "steep" slopes. Steep slopes were defined as greater than 50% slope. RCFC's record on steep slopes is illustrated on the following chart and is closely tied to the shift to cable and other systems from ground skidding.



Comparing Harvest History with Forested Landbase

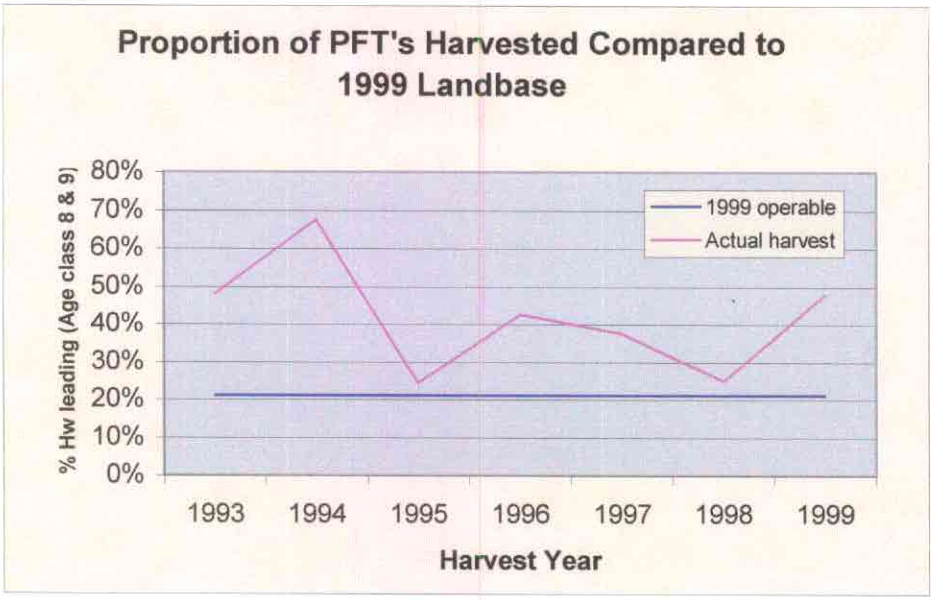
The chart and table below indicates the amount of Hw leading stands (inventory types 12-17) of age class 8 and 9. These are typically our lowest value stands because of the high proportion of pulp logs – pulp logs are our lowest value commodities. Younger hemlock-leading stands have a low pulp log proportion, so they are not "problem" forest types.



Of interest on the chart above is the relative proportion of these hemlock-leading stands across the three scenarios (total forested landbase, 1994 operable and 1999 operable). The entire forested landbase has 21% hemlock leading (age class 8 & 9) while the 1994 operable has 19%. The 1999 operable has 21%. The difference is only 2% across all three scenarios. These interpretations can be made:

1. The new operable (1999) landbase does not have significantly different proportion of PFT's;
2. RCFC is not "high-grading" the forested landbase; and
3. RCFC has not "pumped-up" the operable landbase with low value stands. The area added to the 1994 landbase to create the 1999 landbase has only a slightly higher proportion of hemlock-leading stands.

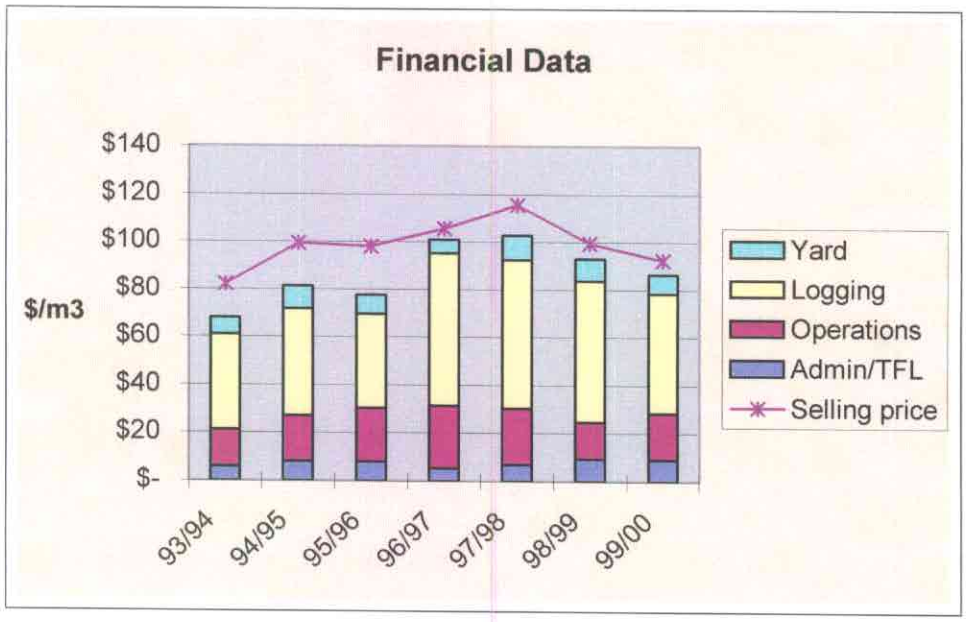
The next question that comes to mind is: Has RCFC historically been harvesting enough of the problem forest types? The *Problem Forest Type* chart on page 4 indicates the target and actual PFT harvesting in terms of <u>area</u> harvested. The following chart indicates RCFC's history in harvesting low value stands in terms of <u>percentages</u> so that a comparison can easily be made to the landbase data as presented.



From the chart, one can easily see that RCFC has been "harvesting the profile" and that the proportion of hemlock-leading stands in the 1999 operable land base is not a problem in terms of RCFC's harvesting practices.

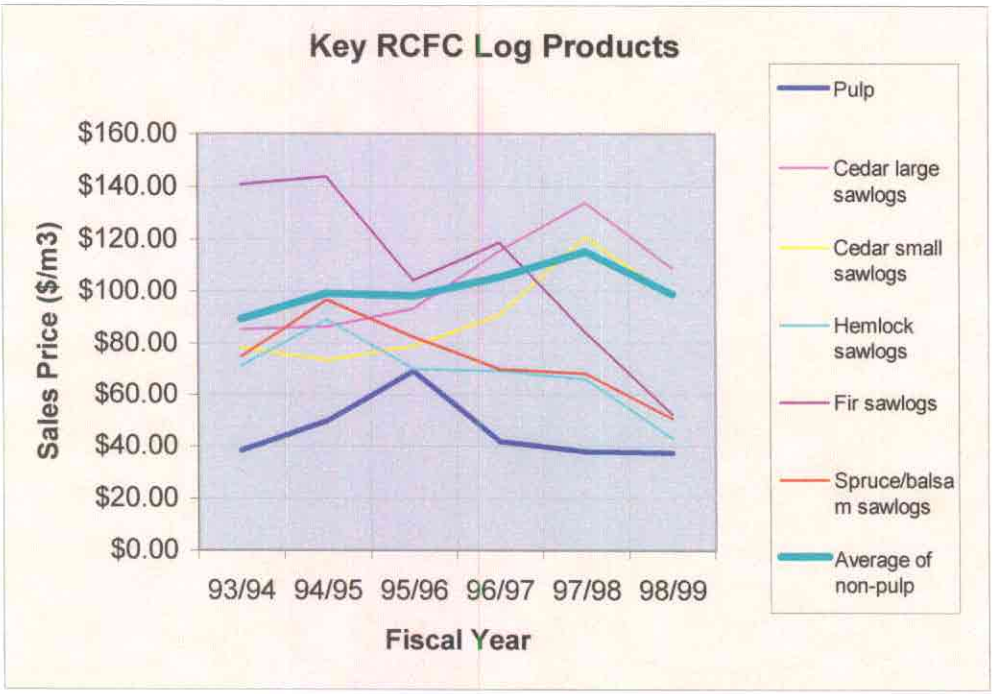
The next question that may be asked relates to the definition of PFT's. PFT's are simply stands that because of their low value present a economic barrier to harvest. We have chosen here to deem only old hemlock-leading stands as PFT's. Two criteria unique to RCFC must be examined in order to understand RCFC's situation regarding PFT's.

First, RCFC has a policy of harvesting the profile. RCFC does not have to make a profit on each cutblock. What this means is that since every stand does not have to "pay", PFT's do not really exist unless low value stands are present in such a high proportion that overall profitability is compromised. This has not yet occurred in any year of RCFC's operation even though RCFC has operated through the recent forest industry recession. RCFC does this by balancing the harvest of low value stands against higher value stands. The chart below illustrates this.



One can see from the chart that RCFC's logging costs – which are closely tied to hemlock pulp proportion – go up as log selling prices goes up. This is because RCFC consciously inserts more low value (high pulp) cutblocks into the annual cutting plans as prices allow while maintaining a reasonable profit. In other words RCFC cuts higher cost wood (high hemlock pulp) as it can afford to – the policy being that RCFC wishes to convert "junk" stands on good growing sites to new high-growth stands. In the chart above, the distance between the selling price "line" and the cost "bar" is the profit.

The second criterion relates to selling price of logs and what we deem to be low-value stands (or PFT's). RCFC is unique in that it has a clear knowledge of what individual log species and sorts are worth. The following chart indicates the selling price over time of the most common log species and sort combinations.



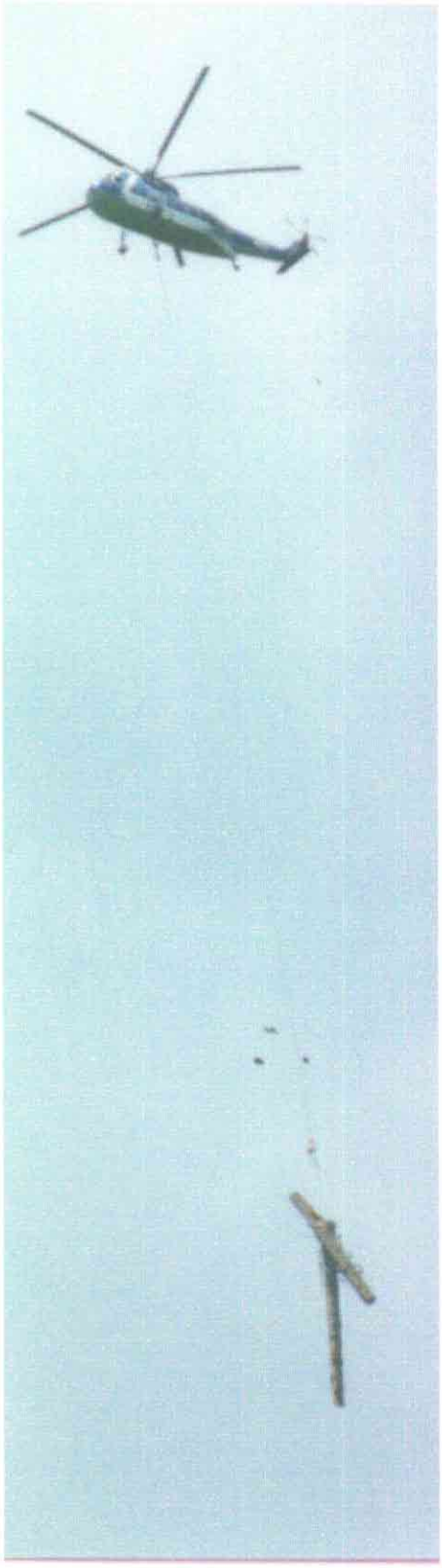
As can be seen on the above chart, pulp logs definitely occupy a region of their own on the chart. They are consistently the lowest value log product on TFL 56. As well, the pulp logs are almost entirely hemlock and most often derived from age class 8 and 9 hemlock-leading stands. This allows us to pinpoint the inventory types and ages (Types 11-15 age class 8 and 9) that are of most concern from an economics perspective.

It should be noted that despite the low value, the other charts indicate that RCFC is indeed harvesting high pulp stands at a rate that is at least consistent with the occurrence on the landbase.

Conclusion

RCFC has exceeded, without exception, all of the harvest requirements set out in MP#2. To do this RCFC has consciously set out to harvest steep slopes and problem forest types. RCFC has had to expand its toolbox of harvest systems, harvest certain areas without expectation of profit, and skilfully blend high cost and low cost areas to maintain its viability while operating in difficult areas.

In light of RCFC's success, the company has expanded its operable landbase up slope and into small valleys that were thought to be economically inaccessible when the 1994 operability line was set. RCFC, with its six years of operations experience, has set a new operability line that encompasses a viable landbase.



Aerial Harvesting in TFL 56 – Past Present and Future

Prepared by
Del Williams R.P.F.

January 27, 2000

Aerial Harvesting in TFL 56 – Past Present and Future

Introduction

This brief report is meant to quantify and clarify the aerial harvesting history in TFL 56 and compares the relative amounts of helicopter harvest with the operable land base.

Discussion

Aerial harvesting in TFL 56 began in the 1980's with shake wood salvage and continues to this date. This has of course been a rather small portion of the overall percentage of wood harvested – so small that it is simply a fraction of 1%. However, it is labour-intensive and contributes generously to the employment created by TFL 56 harvesting activities.

Figure 1: Shake wood salvage on TFL 56

During the review of the operable forest landbase for Management Plan #2 in 1994, it became obvious that substantial quantities of timber were excluded due to harvesting constraints. This prompted RCFC to plan operational trials using helicopters to explore the potential of harvesting these excluded stands. A number of cutting permits were laid out in 1995 and helicopter logging commenced in 1996 on CP's 150 and 132.

Since then, helicopter harvesting has continued in every year to date (although actual aerial yarding of the 1999 felled aerial timber has been postponed until spring 2000)[1]. Table 1 quantifies RCFC's aerial harvest history in the time period 1993 to 1998.

Figure 2: S61 at CP 172-4, Sorcerer Valley, TFL 56.

Average annual harvest by helicopter, as a percentage of the total area harvested, is slightly over 9%. This 9% level was accomplished in very difficult times for the B.C. forest industry. RCFC sees helicopter use no longer as an "alternate" harvest method, but as a standard method. RCFC foresees usage at or greater than 10% annually. Figure 3 illustrates past, present, and expected future use of all harvesting systems on the TFL.

[1] A mechanical problem with the helicopter delayed yarding until too late in the fall – the felled timber became "snowed-in".

Year	Aerially Harvested Area		Total Harvested Area
	Ha	%	Ha
1993	0.0	0%	261.5
1994	0.0	0%	183.8
1995	0.0	0%	115.4
1996	43.1	13%	**341.2**
1997	8.2	3%	**259.4**
1998	19.6	11%	**184.6**
Total	**70.9**	**9%**	**785.2 (1996 to 1998)**

Table 1: Helicopter harvest area by year

RCFC set this target level by a review of the landbase and total chance plan. A total-chance harvesting plan was completed for the entire operable area. All aerial blocks are "tagged" in the database and therefore a total hectarage is available. The map in Appendix 2 indicates all planned aerial blocks within the 1999 aerial landbase. Figure 4 uses this data to illustrate the proportion of helicopter logging proposed in the total chance plan land bases (1994 and 1999 operability lines) and compares them with the average annual usage in the 1996 to 1998 time period.

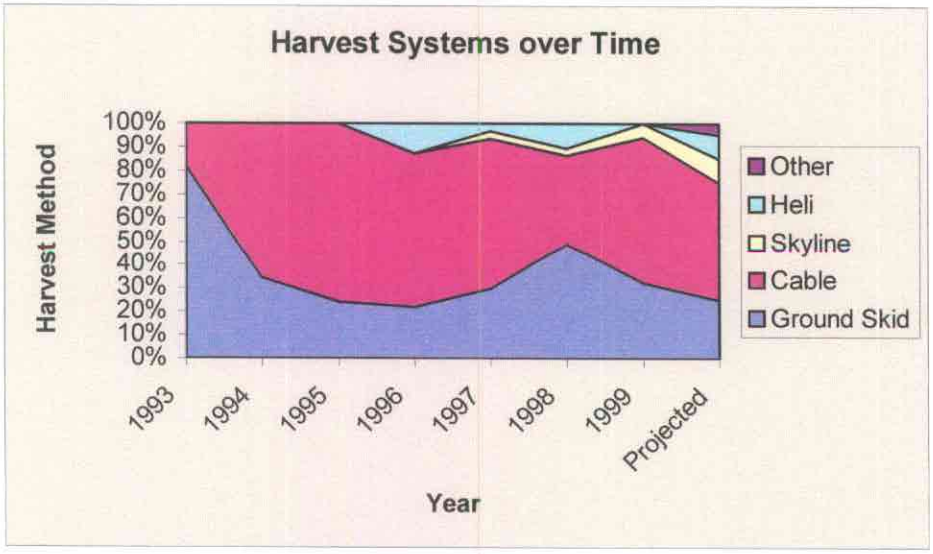


Figure 3: Past, present, and expected future use of harvest systems in TFL 56

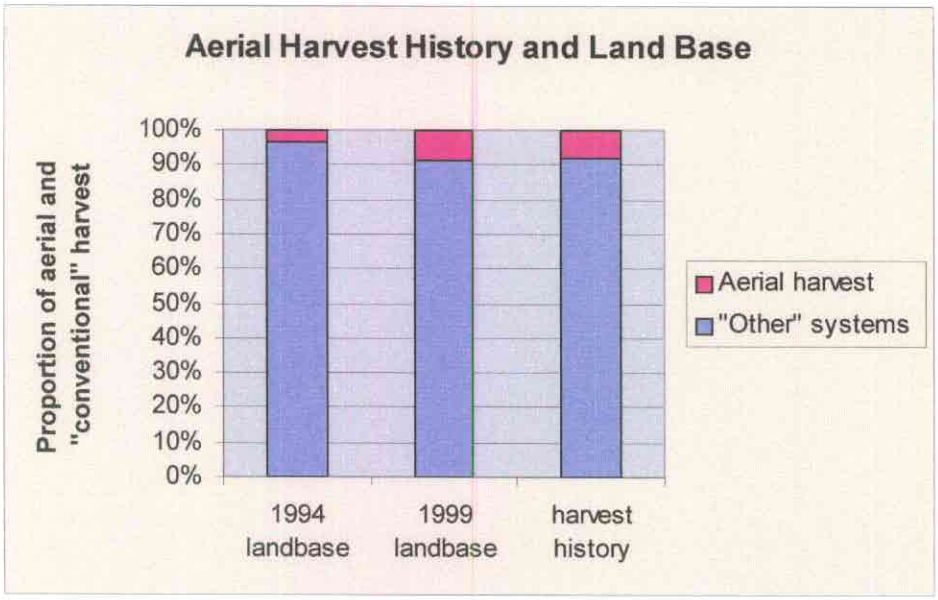


Figure 4: Aerial harvest history and landbase

	Total ha	Heli ha	Heli %
1994 landbase	26326	973	3.7%
1999 landbase	38362	3827	9.9%
Harvest history	785	71	9.0%

Table 2: Aerial landbase statistics

As can be seen from the Figure 4, there is little difference between the proportions of aerial in the 1999 landbase as compared to our three-year average aerial harvesting history. There is a difference between the 1994 landbase and the 1999 landbase. This is because the 1994 operability line excluded most aerial-harvest area – much of the area harvested via aerial methods came from above the 1994 operability line, but within the new 1999 landbase.

Also of concern is the quality of timber that is economically feasible to aerially harvest. Obviously, as the cost of harvesting increases, one must be increasingly cognisant of the value of the product. To ensure that RCFC is not inserting too much poor quality timber into the aerial landbase, a comparison of past aerial harvesting areas with planned aerial harvest blocks is made below.

The timber harvested in the past off of aerial blocks is estimated from the cruise data from each of the blocks. The full data is available in Appendix 1, the data is summarised in Table 3. The average species composition is $C_{63}H_{29}S_{07}F_{01}$.

The timber on the blocks designated for aerial harvest is estimated from the inventory data. Details are listed in Appendix 1 and Table 3.

	Forest Cover %					
	C	H	S	F	B	Other
Aerial Harvest History	62.5%	29.3%	6.8%	1.4%	0.0%	0.0%
Proposed Aerial Harvest Areas	27.5%	33.5%	24.7%	5.0%	7.4%	1.9%

Table 3: Aerial forest cover statistics

As can be seen on the graph (Figure 5) below, the past harvest profile was dominated by cedar with hemlock being second. The projected future aerial harvest areas will have similar proportions of hemlock but the cedar will be partially replaced by spruce.

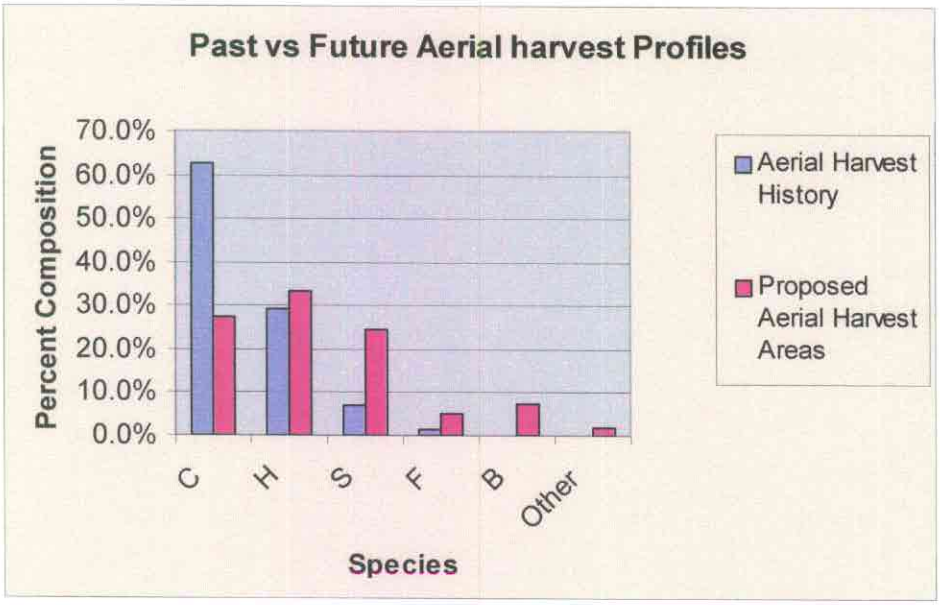


Figure 5: Aerial harvest profiles – past and future

The obvious question is whether the change in species profile will affect the viability of aerial operations. To assess this possibility, a review was conducted of the 6-year average values of the RCFC log products that resulted from the past aerial harvesting, and those that will result from the projected future harvesting. These results are presented in Table 4. Appendix 1 contains the source table for the log values.

Product	6yr avg. price[2]	Harvested profile	Future profile	Weighted avg. value (harvested)	Weighted avg. value (future)
Hemlock composite	$69.31/m3	29.3%	33.5%	$20.31	$23.22
Cedar composite	$102.30/m3	62.5%	27.5%	$63.93	$28.13
Spruce and balsam composite	$89.62/m3	6.8%	32.1%	$6.09	$28.80
Douglas-fir composite	$110.80/m3	1.4%	5.0%	$1.55	$5.54
Other (estimated value)	$50.00/m3	0.0%	1.9%	$0.00	$0.95
		100.0%	100.0%	**$91.89**	**$86.64**

Table 4: Average log values from past aerial harvesting and projected log values for future aerial harvesting.[3]

These figures indicate that the average unit log values of the projected aerial harvest areas are close to historic values despite the species shift. Another factor is the variation of different product and species over the log market cycle. Having a well-balanced inventory of species and grades will allow harvesting at optimum times and thereby allow better than average prices to be achieved.

Conclusion

RCFC has successfully completed several years of aerial harvesting – during this time, approximately 9% of the harvesting (by area) was completed using aerial methods.

In 1999, RCFC set out to update the operability line and total-chance harvesting plans. The goal was to include a reasonable proportion of aerial cutblocks within this new (1999 landbase) operability line. The 1999 landbase now has 9.9% designated for aerial harvest. This is both a reasonable and achievable amount.

The timber species profile indicates that levels of hemlock (our lowest value species) are similar to historical aerially harvested hemlock levels. Proportions of spruce will increase and cedar decrease, however overall average stand values will be only slightly lower than in the past – this indicates that the timber value as well as the timber quantity planned for aerial harvesting are reasonable and achievable.

[2] A log price table is included in Appendix 1.

[3] Log prices are from a six-year average of RCFC log-yard sales. Each species log value is a weighted average value based upon relative volumes sold over six years. For example if Douglas-fir had two products, and over the 6-year period, 50% of the volume was in sawlogs and 50% in house-logs with values of $100 and $150 respectively, the weighted average value would be $125.

Appendix 1
Timber Data

Summary of Helicopter Harvesting on T.F.L. No. 56

Revelstoke Community Forest Corporation

OPENING No.			Logged	Harvest	Harvest	Silv.	m3/Ha Net	TOTAL Block	ABOVE the OCL		PROBLEM FOREST TYPE			SPECIES HARVESTED (Volumes derived from Cruise)							
COMP	C.P.	BLK	Ha	Year	Method	System	Cruise	Volume	%	Ha.	Ha	Volume	Forest Cover Lab.	Forest Cover Label	CEDAR %	CEDAR Volume	HEMLOCK %	HEMLOCK Volume	SPRUCE %	SPRUCE Volume	D.FIR %	D.FIR Volume
100	100	3	8.2	1997	HELI	Clearcut	518	4,247.6	36%	3.0		0.0		CH841, CS841	72%	3,058.3	25%	1,061.9	3%	127.4		0.0
130	132	1	14.8	1996	HELI	Clearcut	450	6,660.0	100%	14.8		0.0		CH931, C841	43%	2,863.8	38%	2,530.8	19%	1,265.4		0.0
130	132	2	15.0	1996	HELI	Clearcut	461	6,915.0	100%	15.0		0.0		CH941, C941	67%	4,633.1	33%	2,282.0		0.0		0.0
150	150	2	5.9	1996	HELI	Clearcut	421	2,483.9	50%	3.0		0.0		CH841	96%	2,384.5	4%	99.4		0.0		0.0
150	150	3	5.3	1996	HELI	Clearcut	395	2,093.5	0%	0.0		0.0		CH841	58%	1,214.2	9%	188.4	27%	565.2	6.0%	125.6
150	150	4	2.1	1996	HELI	Clearcut	326	684.6	0%	0.0		0.0		CH641, SH831	52%	356.0	26%	178.0	22%	150.6		0.0
170	172	4	3.8	1998	HELI	Clearcut	531	2,017.8	100%	3.8	0.6	318.6	HS841	C941, CH841, HS841	39%	786.9	45%	908.0		0.0	16.0%	322.8
100	172	5	15.8	1998	HELI	Clearcut	437	6,904.6	44%	7.0	5.3	2,316.1	HCS841	CH951, HCS841	68%	4,695.1	31%	2,140.4	1%	69.0		0.0
																19,992.0		9,388.9		2,177.7		448.5
																62.5%		29.3%		6.8%		1.4%

Table Showing Inventory Species Composition on all Aerial Blocks Within the 1999 Operability Line

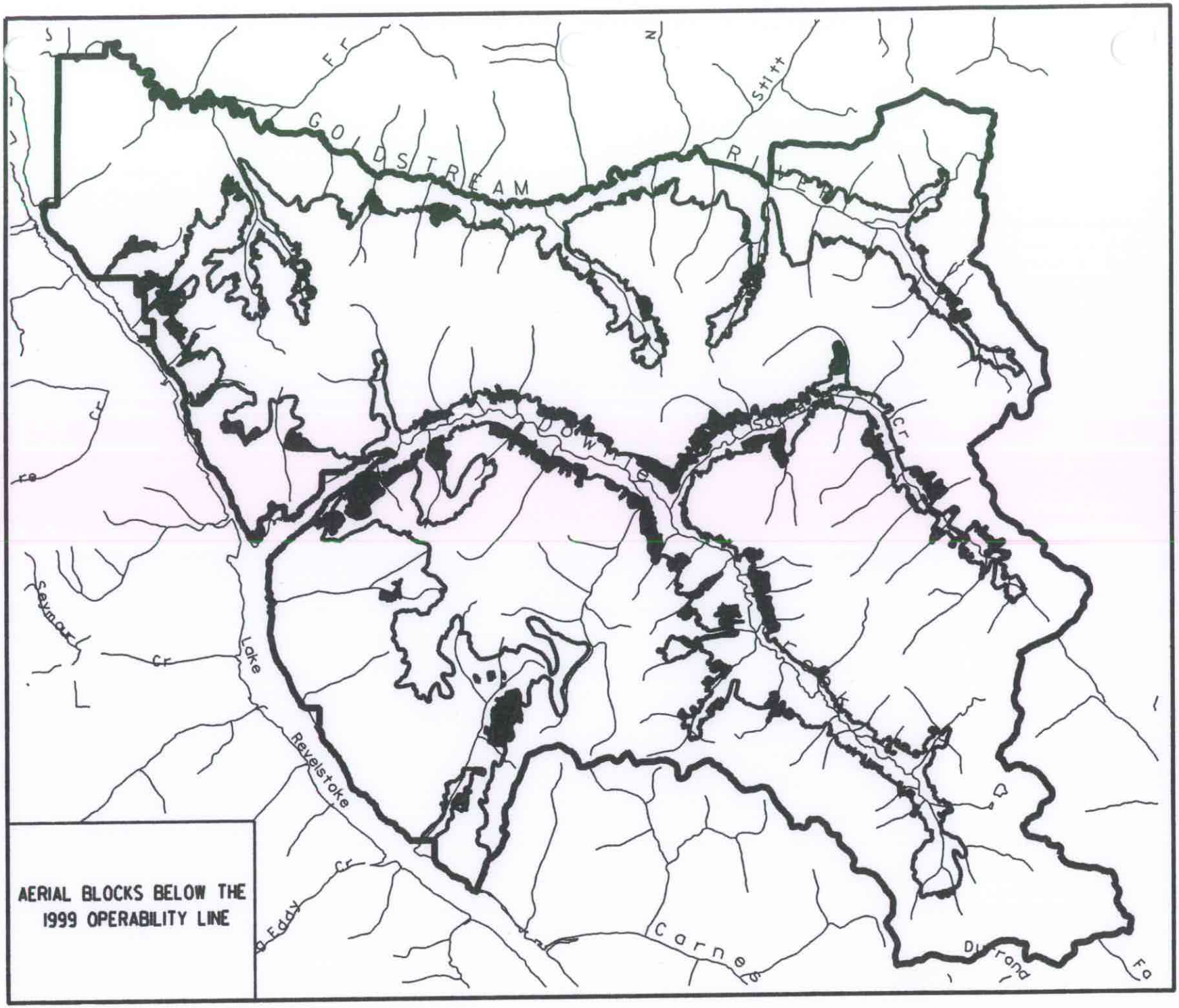
Compiled January 28, 2000

Area	Harvest Method	Species 1	%	Species 2	%	Species 3	%
0.07	A	S	60	B	25	H	15
0.11	A	H	40	C	30	B	30
0.16	A	B	60	H	40		0
0.18	A	F	50	S	20	H	20
0.20	A	H	70	B	15	S	15
0.22	A	H	50	F	50		0
0.29	A	S	50	B	50		0
0.34	A	H	50	S	30	B	10
0.40	A	H	50	S	35	B	15
0.53	A	S	60	C	30	EP	10
0.63	A	B	55	S	45		0
0.64	A	B	70	S	30		0
0.75	A	C	50	S	30	H	20
0.87	A	F	60	S	30	H	10
1.16	A	F	86	EP	14		0
1.17	A	F	50	H	20	C	20
1.22	A	H	70	C	20	S	10
1.23	A	S	60	H	25	B	15
1.36	A	H	70	S	15	C	15
1.41	A	H	50	C	30	EP	20
1.46	A	S	50	C	30	H	10
1.48	A	S	60	H	40		0
1.53	A	H	50	C	40	S	10
1.59	A	F	70	H	30		0
1.77	A	F	60	H	30	C	10
1.88	A	F	85	H	15		0
1.91	A	F	55	H	45		0
2.23	A	B	70	S	15	H	15
2.29	A	H	60	C	30	F	10
2.41	A	H	60	B	40		0
2.70	A	B	60	S	30	C	10
2.84	A	C	50	H	30	S	20
2.97	A	H	70	C	15	S	15
3.12	A	F	70	S	15	H	15
3.35	A	H	87	C	13		0
3.44	A	H	60	S	40		0
3.70	A	C	70	H	30		0
3.99	A	S	50	C	30	H	20
4.32	A	H	80	S	20		0
4.47	A	C	50	H	40	S	10
4.49	A	S	60	B	30	H	10
4.92	A	H	90	S	10		0
4.94	A	C	60	H	30	S	10
4.98	A	B	60	H	30	S	10
5.34	A	S	60	C	40		0
5.65	A	S	50	H	30	C	20
5.66	A	C	60	H	20	S	20
5.96	A	H	85	C	15		0
5.96	A	S	60	H	30	B	10
6.37	A	F	83	EP	17		0
6.52	A	S	30	F	30	H	20
6.54	A	H	60	C	30	S	10
6.73	A	S	60	B	40		0
6.74	A	H	90	B	10		0
6.96	A	S	60	C	30	F	10
6.99	A	S	60	F	30	H	10
7.11	A	H	50	S	40	F	10
7.58	A	F	90	C	10		0
7.96	A	H	50	C	30	F	20
8.02	A	F	40	S	30	H	20
9.21	A	H	50	F	30	C	10
9.24	A	C	60	H	30	B	10
9.33	A	H	60	C	30	EP	10
9.51	A	S	90	C	10		0
9.79	A		0		0		0

10.35	A	H	60	S	30	B	10
10.65	A	S	50	H	30	B	20
10.81	A	F	40	S	30	H	10
11.37	A	F	79	C	15	EP	6
11.55	A	H	70	C	30		0
11.64	A	B	60	S	30	H	10
12.23	A	C	60	S	40		0
12.38	A	S	90	H	10		0
12.45	A	H	80	S	10	C	10
12.54	A	C	40	H	30	S	20
13.15	A	H	50	S	30	B	20
13.25	A	H	60	S	30	C	10
13.29	A	S	60	C	30	B	10
13.67	A	C	80	H	10	S	10
15.01	A	C	50	S	30	H	20
15.28	A	C	60	H	30	F	10
16.00	A	H	50	S	30	C	20
16.32	A	H	50	F	40	C	10
16.81	A	H	80	C	20		0
16.88	A	S	60	H	30	PW	10
17.33	A	H	60	F	30	C	10
17.89	A	F	70	H	20	C	10
18.77	A	H	60	S	30	B	10
18.96	A	H	60	F	40		0
19.40	A	H	70	F	20	C	10
19.44	A	H	60	F	20	C	20
19.67	A	F	50	H	30	C	10
19.84	A	H	90	S	10		0
20.00	A	S	70	B	30		0
20.22	A	F	50	H	50		0
21.72	A	B	50	H	30	S	20
22.38	A	B	90	S	10		0
22.60	A	H	80	C	10	S	10
24.28	A	C	90	S	10		0
26.08	A	H	60	C	30	PW	10
26.52	A	C	60	S	30	H	10
27.26	A	H	40	C	30	PW	20
27.84	A	S	50	B	30	H	20
28.21	A	F	60	H	40		0
29.52	A	S	60	C	30	H	10
30.59	A	H	70	F	15	C	15
32.04	A	F	50	S	30	H	20
43.31	A	F	100		0		0
45.19	A	S	90	B	10		0
46.03	A	C	90	S	10		0
46.62	A	H	50	C	30	S	20
48.38	A	B	60	S	40		0
50.20	A	EP	70	H	10	C	10
55.00	A	S	100		0		0
66.08	A	C	60	S	40		0
67.41	A	S	60	C	40		0
69.69	A	H	100		0		0
72.53	A	S	60	H	40		0
78.86	A	S	60	H	30	B	10
80.42	A	H	90	C	10		0
87.37	A	H	60	S	30	C	10
92.20	A	C	90	H	10		0
93.04	A	S	60	B	30	C	10
94.89	A	S	60	B	30	H	10
98.76	A	S	60	H	30	C	10
126.10	A	C	60	H	30	S	10
140.17	A	H	60	S	40		0
157.17	A	C	100		0		0
179.28	A	H	60	C	30	S	10
274.99	A	S	60	B	40		0
293.37	A	C	60	H	40		0
404.44	A	H	60	C	40		0

3826.58

Appendix 2
Map of Aerial Cutblocks


GOLDSTREAM
R
Lake
Revelstoke
Carnes
AERIAL BLOCKS BELOW THE
1999 OPERABILITY LINE

Appendix 3
Timber Values

Log Sale volumes with values by species groups

Species and Sort	1993/ 1994	1994/ 1995	1995/ 1996	1996/ 1997	1997/ 1998	1998/ 1999	6 year average	Total by species group	% product by species group	average value	species group value (wtd avg.)
Spruce tonewood		226	18	129	213	38	125		1.9%	$212	
Spruce super sort				1432	1169	502	1035		15.8%	$154	
Spruce high grade	1255	3182	4151	1099	691	328	1784		27.3%	$138	
Spruce house logs			311	183	170	230	223		3.4%	$127	
Spruce/balsam peelers	1441	1883	3039	1958	2381	1184	1981		30.3%	$105	
Spruce/balsam sawlogs	873	1368	2638	1412	974	1096	1393	6541	21.3%	$74	$90
Hemlock high grade				513	1065	651	743		11.6%	$83	
Hemlock sawlogs	5991	8349	3137	8817	3695	2726	5452		85.5%	$68	
Hemlock peelers						185	185	6380	2.9%	$55	$69
Pulp	22257	27621	21671	55010	48387	29902	34141	34141	100.0%	$46	$46
Fir sawlogs	1358	501	433	1157	1260	153	810		73.6%	$107	
Fir house logs					286	16	151		13.7%	$129	
Fir high grade					97	180	139	1100	12.6%	$112	$111
White pine sawlogs	38	102	64	40	191	49	81	81	100.0%	$102	$102
Cedar large sawlogs	4875	14126	12241	23133	8328	14010	12786		53.8%	$104	
Cedar small sawlogs	2718	7029	7151	11877	5141	5079	6499		27.3%	$90	
Cedar shake slabs	366	1299	1340	5059	2941	3000	2334		9.8%	$90	
Cedar poles	213	313	388	1737	420	796	645		2.7%	$153	
Cedar house logs				401	190	185	259		1.1%	$180	
Cedar shake blocks		389	767	65	311	112	329		1.4%	$225	
Cedar large shake logs						781	781		3.3%	$94	
Cedar select large sawlogs						70	70		0.3%	$163	
Cedar boomsticks				61			61	23763	0.3%	$110	$102
Non pulp	19128	38767	35678	59073	29523	31370	37866	37866			
pulp	22257	27621	21671	55010	48387	29902	34141	34141			

Source: RCFC annual financial reports list volumes sold and average values for each year of operation. This table averages the value over the 6-year period. Note that half of the sawlogs are not sold through the logyard but go directly to the industry partners. Non pulp total annual volumes include only sort yard volumes.